**Video Meet - Product Requirements Document (Updated)**

**1. Product Overview**

**Product Name: Video Meet  
Version: 2.0  
Target Audience: Individuals, teams, and organizations needing reliable video communication across web, desktop, and local networks  
Core Purpose: Connect people through high-quality video calls with an intuitive, reliable interface that works seamlessly across cloud, local networks, and offline environments**

**2. Platform Support**

**2.1 Multi-Platform Architecture**

* **Web Application - Browser-based access via Progressive Web App (PWA)**
* **Desktop Applications - Native apps for Windows, macOS, and Linux using Electron**
* **Hybrid Connectivity - Seamless switching between cloud and local network modes**

**2.2 Connection Modes**

* **Cloud Mode - Traditional server-mediated connections**
* **Local Network Mode - Direct P2P connections within LAN/WiFi networks**
* **Hybrid Mode - Automatic fallback between local and cloud connectivity**
* **Offline Mode - Local network-only operation without internet dependency**

**3. Feature Requirements**

**3.1 Core Features (MVP)**

**Multi-Platform User Authentication**

* **Sign up / Sign in with email and password (cloud mode)**
* **Local device profiles for offline/LAN-only usage**
* **Guest access with temporary names across all platforms**
* **Cross-platform profile synchronization**

**Enhanced Room Management**

* **Create instant meetings (cloud or local network)**
* **Local Network Discovery - Automatically find nearby Video Meet users**
* **Network Invitations - Send direct invitations to LAN users**
* **Join meetings via room ID/link/local network broadcast**
* **Schedule meetings for future (cloud mode)**
* **Room password protection (all modes)**
* **Auto-discovery toggle - Control visibility on local networks**

**Advanced Video Calling**

* **1-on-1 and group video calls (up to 10 participants initially)**
* **Direct P2P connections for local network users**
* **Adaptive connection routing - Automatic best-path selection**
* **Audio-only mode with bandwidth optimization**
* **Camera/microphone toggle with hardware integration**
* **Screen sharing with multi-monitor support**
* **Network-aware quality adjustment - Different quality profiles for LAN vs internet**

**Real-time Communication**

* **Text chat during calls (persisted locally in offline mode)**
* **Participant list with network status indicators**
* **Join/leave notifications with connection type display**
* **File sharing - Direct file transfer over local network**
* **Network diagnostics - Connection quality indicators**

**3.2 Enhanced Features (Phase 2)**

**Desktop-Specific Features**

* **System tray integration - Background operation and quick access**
* **Native notifications - OS-level meeting alerts and messages**
* **Auto-start functionality - Launch on system startup**
* **Hotkey support - Global shortcuts for mute/video toggle**
* **Multi-monitor awareness - Smart window placement and screen sharing**

**Local Network Features**

* **Network topology mapping - Visual display of connected local users**
* **Broadcast meetings - Announce meetings to all local network users**
* **Network bridge mode - Connect local and cloud participants in same meeting**
* **Bandwidth management - Prioritize local traffic, optimize for network conditions**
* **Offline meeting history - Local storage of meeting records**

**Advanced Connectivity**

* **VPN detection and handling - Smart routing through VPN networks**
* **Firewall traversal - STUN/TURN integration for complex network setups**
* **Connection resilience - Automatic reconnection with path optimization**
* **Network handoff - Seamless transition between WiFi/Ethernet/mobile networks**

**3.3 Enterprise Features (Phase 3)**

* **Corporate network integration - Active Directory/LDAP support**
* **Network policy compliance - Respect corporate firewall rules**
* **Centralized management - IT admin controls for local network discovery**
* **Audit logging - Comprehensive connection and usage tracking**
* **Custom deployment - Self-hosted server options for enterprises**

**4. User Stories**

**4.1 Desktop User Stories**

**As a desktop user, I want to:**

* **Install a native app so I can access Video Meet without opening a browser**
* **Receive system notifications so I don't miss meeting invitations**
* **Use global hotkeys so I can quickly mute/unmute during other tasks**
* **Auto-start the app so I'm always available for quick meetings**
* **Minimize to system tray so the app doesn't clutter my taskbar**

**4.2 Local Network User Stories**

**As a user on a local network, I want to:**

* **See nearby colleagues so I can quickly start impromptu meetings**
* **Send direct invitations so I can connect without internet dependency**
* **Share files during meetings so I can collaborate more effectively**
* **Have high-quality video so I can take advantage of local bandwidth**
* **Work offline so network outages don't interrupt local collaboration**

**4.3 Hybrid User Stories**

**As a hybrid worker, I want to:**

* **Seamlessly switch networks so my meetings continue when I move locations**
* **Connect local and remote participants so I can include both office and remote team members**
* **Optimize for my connection so I get the best quality regardless of network type**
* **Maintain meeting history so I can access records across all connection modes**

**5. Technical Requirements**

**5.1 Performance Requirements**

**Desktop Application**

* **Startup time: < 3 seconds cold start, < 1 second warm start**
* **Memory usage: < 200MB idle, < 500MB during video calls**
* **CPU usage: < 10% idle, < 30% during video calls**
* **Update mechanism: Automatic background updates with rollback capability**

**Local Network Performance**

* **Discovery time: < 2 seconds to find local users**
* **P2P connection: < 1 second to establish direct connection**
* **Local latency: < 50ms for LAN connections**
* **File transfer: > 10MB/s for local file sharing**
* **Bandwidth utilization: > 80% efficiency for local network usage**

**Hybrid Connectivity**

* **Fallback time: < 3 seconds to switch between connection modes**
* **Quality adaptation: Real-time adjustment based on network conditions**
* **Connection resilience: 99.5% uptime during network transitions**

**5.2 Security Requirements**

**Local Network Security**

* **Device authentication - Certificate-based trust establishment**
* **Network encryption - End-to-end encryption for all local communications**
* **Access control - User-configurable discovery and invitation permissions**
* **Network isolation - Respect network boundaries and VLANs**

**Cross-Platform Security**

* **Secure storage - Platform-appropriate credential storage (Keychain, Windows Credential Manager)**
* **Code signing - Verified desktop application signatures**
* **Update security - Cryptographically signed update packages**
* **Privacy controls - Granular permissions for network discovery and file sharing**

**5.3 Scalability Requirements**

**Network Architecture**

* **Mesh connectivity - Support for complex local network topologies**
* **Hybrid scaling - Seamless integration of local and cloud participants**
* **Load distribution - Intelligent routing to reduce server load**
* **Geographic optimization - Regional server selection with local network preference**

**6. Technology Stack Updates**

**6.1 Desktop Application Stack**

* **Framework: Electron 28+ with TypeScript**
* **UI Framework: React with native desktop components**
* **State Management: Redux Toolkit with offline persistence**
* **Native Integration: Node.js native modules for system integration**
* **Auto-updater: Electron-updater with staged rollouts**
* **Package Management: electron-builder for multi-platform builds**

**6.2 Local Network Stack**

* **Service Discovery: mDNS/Bonjour (dns-sd library)**
* **P2P Connectivity: Enhanced WebRTC with STUN/TURN fallback**
* **Network Detection: Network interface enumeration and monitoring**
* **File Transfer: WebRTC DataChannel with chunked transfer protocol**
* **Local Storage: SQLite for offline data persistence**

**6.3 Enhanced Backend Stack**

* **Network Services: mDNS responder integration**
* **Connection Broker: Hybrid P2P/server connection management**
* **Network Monitoring: Real-time network topology awareness**
* **File Service: Temporary file relay for hybrid scenarios**

**7. User Interface Requirements**

**7.1 Desktop-Specific UI Components**

* **Native menus - Platform-appropriate menu bars and context menus**
* **System tray interface - Quick access controls and status indicators**
* **Native dialogs - File pickers, notifications, and system integration**
* **Multi-window support - Separate windows for different meetings**
* **Accessibility - Full keyboard navigation and screen reader support**

**7.2 Network Discovery Interface**

* **Network users panel - Live list of discoverable local users**
* **Connection status indicators - Visual feedback for connection types**
* **Network diagnostics overlay - Real-time network performance metrics**
* **Invitation management - Send/receive/manage local network invitations**

**8. Data Requirements**

**8.1 Local Data Storage**

* **Device profiles - Local user configurations and preferences**
* **Meeting cache - Offline-accessible meeting history and recordings**
* **Network topology - Cached information about local network structure**
* **Security certificates - Local trust store for device authentication**

**8.2 Hybrid Data Synchronization**

* **Profile sync - Cross-platform user profile synchronization**
* **Meeting history - Unified history across local and cloud meetings**
* **Contact lists - Synchronized contacts with local network awareness**
* **Settings sync - Consistent application settings across devices**

**9. Success Metrics**

**9.1 Desktop Application Metrics**

* **Adoption rate - Desktop app usage vs web app usage**
* **Session duration - Average time spent in desktop app**
* **Feature utilization - Usage of desktop-specific features**
* **Update compliance - Percentage of users on latest version**

**9.2 Local Network Metrics**

* **Discovery success rate - Percentage of successful device discoveries**
* **P2P connection rate - Direct connections vs server-relayed connections**
* **Local bandwidth utilization - Efficiency of local network usage**
* **Offline usage - Meetings conducted without internet connectivity**

**10. Development Phases**

**Phase 1 (MVP Desktop + Local Network - 8 weeks)**

* **Basic Electron desktop application**
* **Local network discovery and P2P connections**
* **Essential desktop features (system tray, notifications)**
* **Local network video calling**
* **Basic file sharing**

**Phase 2 (Enhanced Desktop Experience - 4 weeks)**

* **Advanced desktop integration (hotkeys, auto-start)**
* **Hybrid connectivity (local + cloud participants)**
* **Enhanced UI for network management**
* **Improved file transfer capabilities**

**Phase 3 (Enterprise & Optimization - 4 weeks)**

* **Enterprise features and network policies**
* **Performance optimization and monitoring**
* **Advanced security features**
* **Comprehensive analytics and reporting**

**11. Risk Assessment**

**11.1 Technical Risks**

* **Network complexity - Handling diverse network configurations**
* **Desktop platform differences - Ensuring consistent experience across platforms**
* **P2P connectivity issues - NAT traversal and firewall challenges**
* **Security vulnerabilities - Local network attack vectors**

**11.2 Mitigation Strategies**

* **Extensive network testing - Test across various network configurations**
* **Platform-specific testing - Dedicated QA for each desktop platform**
* **Fallback mechanisms - Always provide server-relay option**
* **Security audits - Regular penetration testing and code audits**
* **Gradual rollout - Phased deployment with feature flags**